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AP-902

Quarterly Development Report

for

DEVELOPMENT OF -

FILM DIELECTRIC CAPACITORS ---- HIGH TEMPERATURE

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This report covers the period September 19th, 1952 to December 15th, 1952

TOBE DEUTSCHMANN CORPORATION

921 Providence Highway
Norwood, Massachusetts

NAVY DEPARTMENT BUREAU OF SHIPS --- ELECTRONICS DIVISION

Contract No. NObsr - 57200

Index No. NE-111016, St. 1.

Date of Contract: Feb. 20, 1952

Date of Report: Dec. 22, 1952

C M P Classification: Class "A" Product

Certification DO-A-7; certified under CMP Regulation #3

SECURITY INFORMATION

RESTRICTED

R-E-S-T-R-I-C-T-E-D

ABSTRACT

We feel that our experience with Mylar A is sufficient to allow us to evaluate briefly the major advantages and disadvantages of this material as a dielectric.

Mylar A as a dielectric, with faults eliminated, surpasses paper impregnated Capacitors. At 85° C., 1 Mfd. Capacitors constructed with two half mil layers of this film between foils will operate at 2,000 V.D.C. for at least 72 hours with a loss of units not exceeding 30 %.

Moreover, these are untreated units, and of the failures that do occur, most fail early and are caused by the high fault count. No conventional paper impregnated unit of similar construction will match this feat.

From the few tests run at elevated temperatures, we predict a similar performance at 125° C., i.e. Mylar will withstand higher voltage stress than paper units.

Probably, the greatest overall advantage is the fact that these results are obtained with unprocessed units. From the winding machine into a container without the handling and re-handling of impregnated units -- and without these accumulative costs.

Metallized Mylar follows a similar pattern, but its superiority outshines plain Mylar. Actually, this is probably an allusion created by the fact that metallized Mylar has only one competitor, whereas plain Mylar A challenges the field.

S-E-C-U-R-I-T-Y

I-N-F-O-R-M-A-T-I-O-N

R-E-S-T-R-I-C-T-E-D

R E S T R I C T E D

Compared to metallized paper, metallized Mylar will match it, size for size, in the low voltage groups, and will come in smaller containers in the higher voltage units. It will be a better electrical capacitor and will operate over a much wider temperature range.

The most obvious objection to Mylar, to date, is found in the relatively high fault count. The initial dielectric failures are still too high to allow production of low-cost units. It is possible that with some further treatment of the dielectric, such as impregnation with oil or a substitute, the number of failures may be reduced. At the moment, however, this is supposition since the project to date embraces only untreated Mylar A units.

Probably the next objection to the material is its reluctance to perform on a winding machine like conventional dielectrics. Having greater tensile strength, it very seldom ruptures, but rather stretches and causes wrinkling at the start of the winding. Moreover, being transparent, the operator has great difficulty maintaining even margins, since the material naturally tends to sway.

Lastly, the static charges developed make margin alignment a problem. While these are difficulties now, they are not insurmountable, and with a little study and effort should be remedied.

R-E-S-T-R-I-C-T-E-D

Part I.

PURPOSE

A. Develop Film Dielectric Capacitors, high temperature, utilizing DuPont "Mylar" Film (V-200) or equivalent, as a capacitor dielectric, in order to achieve higher temperature operation and greater reliability of fixed paper capacitors, in accordance with Bureau of Ships Contract Specification SHIPS F-400, dated 15 September, 1951, as follows:

B. Phase I.

1. Evaluate a V-200 film or equivalent in accordance with paragraph 3.2.1 of referenced Bureau of Ships Contract Specification SHIPS F-499.
2. Furnish fifty (50) each of various capacitors as described in paragraph 3.2.1 of referenced Bureau of Ships Contract Specification SHIPS F-499.
3. Submit reports as specified therein.

C. Phase II.

1. Evaluate a V-200 film or equivalent with metallized electrodes in accordance with paragraph 3.2.2. of referenced Bureau of Ships Contract Specification SHIPS F-499.
2. Furnish fifty (50) each of various capacitors as described in paragraph 3.2.1 of referenced Bureau of Ships Contract Specification SHIPS F-499.

S-E-C-U-R-I-T-Y I-N-F-O-R-M-A-T-I-O-N

R-E-S-T-R-I-C-T-E-D

R-E-S-T-R-I-C-T-E-D

C. Phase II. (continued)

3. Furnish one (1) set of Type D. Class IV Manufacturing Drawings in accordance with Bureau of Ships Specification 16D19(RE) , dated 15 January 1946, and Amendment No. 2 dated 1 May 1948.
4. Submit Reports as specified herein.

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GENERAL FACTUAL DATA

We had on hand fifty pieces of the 1 Mfd. 2" x .0005" Mylar A with 1/8" margins remaining from earlier tests. These were tested along with twenty-five units similarly constructed, but from the second shipment of Mylar A. (See Part III, p.p. 4, 5, 6). The voltages were not the same on the three groups, and of course that factor must be taken into consideration, but we found that we lost only one unit wound with the material from the second shipment as against four and six -- wound with that of the first shipment. This merely substantiates our previous statements that the film itself is not yet consistent.

After the units made for these tests were assembled and soldered, they were run through a degreaser and exposed to the vapors of trichloroethylene to remove soldering film and other smudge.

~~R-E-S-T-R-I-C-T-E-D~~GENERAL FACTUAL DATA (continued)

During this process, several units dropped off the baskets down into the boiling liquid (87° C.). The units were open and some of this contaminated mixture managed to seep into the cans and onto the sections. We placed twenty-five of these units on Life Test along with twenty-three units of the regular process, i. e. only exposed to the vapor. Within eight (8) hours, every unit within the immersed group had failed (See Part III, P. 14).

Examination revealed that almost every unit had failed somewhere along the outer quarter of the winding at the margin. This particular group was not tested with any intent to supply data for the general classification, but rather to determine the effect of the immersion.

We found when we changed from the 1 Mfd. $2 \times .0005''$ unit to the 1 Mfd. $2 \times .00025''$ unit that we had difficulty getting the section wound to our specifications into the can. By depleting a few of the outer turns and decreasing the margins, the winding fit snugly into the container, but not without a sacrifice of some capacitance.

The 1 Mfd. $2 \times .0005''$ unit averages about .9 Mfd. while the 1 Mfd. $2 \times .00025''$ unit averages about .75 Mfd.

~~S-E-C-U-R-I-T-Y~~ ~~I-N-F-O-R-M-A-T-I-O-N~~~~R-E-S-T-R-I-C-T-E-D~~

R-E-S-T-R-I-C-T-E-D

GENERAL FACTUAL DATA (continued)

We found that the .00025" film taken at random, as we did for these units, gauged up to and even surpassed .0003" . The next sections scheduled are to be wound with pre-gauged rolls, with an attempt to maintain a balance as close to .00025" as possible.

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DETAIL FACTUAL DATAPHASE I.

Work resumed with 1 Mfd. units constructed with two .0005" Mylar A films between foils and tested at 85° C.

A. Seventy-five units divided into three groups of twenty-five each.

1. Tested at 2100 V. D. C. , two units failed voltage test prior to Life Test. Both were Mylar faults. The remaining twenty-three units were placed on test and ten completed 114 hours. There were three mechanical failures and ten Mylar faults. (See Part III, P. L.)
2. Tested at 2200 V. D. C. , four units failed voltage test prior to Life Test. Two were mechanical failures and two were Mylar faults. The remaining twenty-one units were placed on test; seven completed 101 hours. There were two mechanical failures and fourteen Mylar faults. (See Part III, P. 2.)

S-E-C-U-R-I-T-Y I-N-F-O-R-M-A-T-I-O-N

R-E-S-T-R-I-C-T-E-D

R-E-S-T-R-I-C-T-E-D**DETAIL FACTUAL DATA (continued)**

3. Tested at 2300 V.D.C., four units failed voltage test prior to Life Test. Two were mechanical failures and two were Mylar faults. The remaining twenty-one units were placed on test and four completed 73 hours. There were three mechanical failures, eleven Mylar faults, and three units opened during test. (See Part III, P. 3)

B. Seventy-five units divided into three groups of twenty-five each.

1. Tested at 1900 V.D.C., one unit failed voltage test prior to Life Test. This was a Mylar fault. The remaining twenty-four units were placed on test and fifteen completed 73 hours. There were two mechanical failures and seven Mylar faults. (See Part III, P. 4)
2. Tested at 2000 V.D.C., four units failed voltage test prior to Life Test. There was one mechanical failure and three Mylar faults. The remaining twenty-one units were placed on test, and twelve completed 99 hours. There were three mechanical failures and five Mylar faults. One opened during the test. (See Part III, P. 5.)
3. Tested at 2100 V.D.C., six units failed voltage test prior to Life Test. Two were mechanical failures and four were Mylar faults. The remaining nineteen units were placed on test, and twelve completed 101 hours. One mechanical failure and six Mylar faults were noted here. (See Part III, P. 6).

R-E-S-T-R-I-C-T-E-D

DETAIL FACTUAL DATA (continued)**C. Seventy-five units divided into three groups of twenty-five each.**

1. Tested at 1800 V.D.C., there were no voltage failures prior to Life Test. All twenty-five units were placed on Life Test, and thirteen completed 146 hours. There was one mechanical failure and ten Mylar faults. One opened during the test. (See Part III, P. 7.)
2. Tested at 1900 V.D.C., there were no voltage failures prior to Life Test. All twenty-five units were placed on Life Test, and seventeen completed 250 hours. There was one mechanical failure and six Mylar faults. One opened during the test. (See Part III, P. 8.)
3. Tested at 2000 V.D.C., two units failed prior to Life Test. One was a mechanical failure, and the other an intermittent open, caused by a broken top tab. The remaining twenty-three units were placed on test, and twelve completed 227 hours. There were two mechanical failures and six Mylar faults. Three opened during the test. (See Part III, P. 9)

D. Seventy-five units divided into three groups of twenty-five each.

1. Tested at 1900 V.D.C.; one unit failed voltage test prior to Life Test. This was a mechanical failure. The remaining twenty-four were placed on test, and fourteen completed 131 hours. There were four mechanical failures, and five Mylar faults. One unit opened during the test. (See Part III, P. 10)

S-E-C-U-R-I-T-Y I-N-F-O-R-M-A-T-I-O-N

R-E-S-T-R-I-C-T-E-D

~~R-E-S-T-R-I-C-T-E-D~~

2. Tested at 2000 V.D.C., one unit failed voltage test prior to Life Test. a mechanical failure. The remaining twenty four were placed on test, and fourteen completed 146 hours. There were three mechanical failures, and seven Mylar faults. (See Part III, P. 11.)
 3. Tested at 2100 V.D.C., three units failed voltage test prior to Life Test. One was a mechanical failure and two were Mylar faults. The remaining twenty-two were placed on Life Test, and fourteen completed 74 hours. There were two mechanical failures, and six Mylar faults. (See Part III, P. 12.)
- E. Forty-eight units were divided into two groups of twenty-three and twenty-five each.
1. Tested at 2000 V.D.C., three units failed voltage test prior to Life Test. Two were mechanical failures and one a Mylar fault. The remaining twenty units were placed on Life Test, and nineteen completed 72 hours. There was one mechanical failure. (See Part III, P. 13).
 2. Tested at 2000 V.D.C., two units failed voltage test prior to Life Test. Both were Mylar faults. The remaining twenty-three were placed on Life Test, and all failed within 8 hours. All were Mylar faults, resulting from immersion in Trichloroethylene. (See Part III, P. 14).

R-E-S-T-R-I-C-T-E-D

F. The project changed at this point to 1 Mfd. units constructed with two .00025" Mylar A films between foils, and tested at 85° C. Seventy-five units divided into three groups of twenty-five each made up this test.

1. Tested at 700 V.D.C., two units failed prior to Life Test. Both were mechanical failures. The remaining twenty-three units were placed on test, and twenty-one completed 74 hours. Two were Mylar faults. (See Part III, P. 15)
2. Tested at 800 V.D.C., one unit failed prior to Life Test. It was a mechanical failure. The remaining twenty-four were placed on Life Test, and twenty-three completed 90 hours. There was one Mylar fault. (See Part III, P. 16).
3. Tested at 900 V.D.C., one unit failed prior to Life Test. This was a mechanical failure. The remaining twenty-four were placed on test, and twenty-two completed 76 hours. There were two Mylar faults. (See Part III, P. 17).

G. Seventy-five units divided into three groups of twenty-five each.

1. Tested at 1000 V.D.C., two units failed prior to Life Test. Both were mechanical failures. The remaining twenty-three were placed on Life Test, and twenty-two completed 74 hours. There was one Mylar failure. (See Part III, P. 18).
2. Tested at 1100 V.D.C., four units failed prior to Life Test. All four were mechanical failures. The remaining twenty-one units were placed on Life Test, and twenty completed 76 hours. There was one mechanical failure. (See Part III, P. 19)

~~R-E-S-T-R-I-C-T-E-D~~

3. Tested at 1200 V. D. C. , three units failed prior to Life Test. One was a Mylar fault and two were mechanical failures. The remaining twenty-two were placed on Life Test, and nineteen completed 77 hours. The results show one mechanical failure, one Mylar fault, and one unit opened during Life Test. (See Part III, P. 20.)

H. Seventy-five units divided into three groups of twenty-five each.

1. Tested at 1300 V. D. C. , three units failed prior to Life Test. All were mechanical failures. The remaining twenty-two were placed on Life Test, and sixteen completed 82 hours. The results show five Mylar faults. One unit opened during the test. (See Part III, P. 21).
2. Tested at 1400 V. D. C. , seven units failed prior to Life Test. One was mechanical and six were Mylar faults. The remaining eighteen units were placed on Life Test, and thirteen completed 86 hours. There was one mechanical failure, and four Mylar faults. (See Part III, P. 22.)
3. Tested at 1500 V. D. C. , there were no failures prior to Life Test. All twenty-five were placed on Life Test, and fourteen completed 79 hours. The results show one mechanical failure, and ten Mylar faults. (See Part III, P. 23.)

R-E-S-T-R-I-C-T-E-D

- I. Seventy-five units divided into three groups of twenty-five each
1. Tested at 1600 V. D. C. , five units failed prior to Life Test. One was a mechanical failure, and four were Mylar faults. The remaining twenty units were placed on Life Test, and fifteen completed 83 hours. Four were Mylar faults. One opened during the test. (See Part III, P. 24.)
 2. Tested at 1700 V. D. C. , three failures were observed prior to Life Test. One was a mechanical failure, and two were Mylar faults. The remaining twenty-two were placed on Life Test, and five completed 74 hours. One was a mechanical failure and sixteen were Mylar faults. (See Part III, P. 25.)
 3. Tested at 1800 V. D. C. , five units failed prior to Life Test. All were Mylar faults. The remaining twenty units were placed on Life Test, and four completed 73 hours. Results showed two were mechanical failures, and fourteen were Mylar faults. (See Part III, P. 26.)

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<u>DETAIL</u>	<u>FACTUAL</u>	<u>DATA</u>	<u>PHASE</u>	<u>II.</u>
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- J. Twenty-four .25 Mfd. units constructed of single layer .0005" Metallized Mylar 1" wide with 1/16" margins, divided into two groups of twelve units each.
1. Tested at 1200 V. D. C. , at 85° C. , eight units completed 279 hours without a complete breakdown. Four units opened during the test. (See Part III, P. 30.)

R-E-S-T-R-I-C-T-E-D

DETAIL FACTUAL DATA (continued)

2. Tested at 1500 V.D.C., at 85° C., one failed completely after 15 minutes. Three completed 253 hours. Six units opened during the test. Two failed mechanically, and each unit suffered the loss of one end terminal during the test. (See Part III, P.P. 32, 33.).

K. Sixty .25 Mfd. units constructed of single layer .0005" Metallized Mylar 1" wide with 1/16" margins divided into three groups of twenty units each.

1. Tested at 800 V.D.C., at 85° C., all units completed 351 hours without a complete breakdown. The average for the entire period was 4.2 temporary, self-healing breakdowns per Microfarad. (See Part III, P.P. 34, 35.).
2. Tested at 1000 V.D.C., at 85° C., all units completed 318 hours without a complete breakdown. The average for the entire period was 23 temporary, self-healing breakdowns per microfarad. (See Part III P.P. 36, 37, 38)
3. Tested at 1200 V.D.C., at 85° C., all units completed 250 hours without a complete breakdown. The average for the entire period was 53 temporary, self-healing breakdowns, per microfarad. (See Part III, p.p. 39, 40, 41.)

S-E-C-U-R-I-T-Y I-N-F-O-R-M-A-T-I-O-N

R-E-S-T-R-I-C-T-E-D

R-E-S-T-R-I-C-T-E-D

C O N C L U S I O N S :

- A. First, the 1 Mfd. unit constructed with two layers of .0005" Mylar A. between foils.

Combining the results of tests NObsr #22 through NObsr #40, we find a definite pattern (See Part III, P. 27.) Tests above NObsr #22 were not at 85° C., and cannot be used here, but will be averaged later when we get to their classifications. Test NObsr #41 is not included in the computations used because, as we pointed out on Page , this was more a test within a test.

<u>Temperature</u>	<u>Voltage D. C.</u>	<u>Percent Mylar Failures</u>	<u>Number of Units Tested</u>
85° C.	1000	1.	23
"	1200	1.	24
"	1400	2.	23
"	1600	4.8	21
"	1800	22.	46
"	1900	24.5	73
"	2000	20.8	108
"	2100	33.6	65
"	2200	62.0	21
"	2300	52.5*	21

Examination of the above table shows that at 2000 volts, we find fewer Mylar A Life Test failures than at 1900 volts. However,

S-E-C-U-R-I-T-Y I-N-F-O-R-M-A-T-I-O-N

R-E-S-T-R-I-C-T-E-D

R-E-S-T-R-I-C-T-E-D

CONCLUSIONS (continued)

by referring to the chart (Part III, P. 27), we note that Test Group NObsr #40 completed its Life Test without any Mylar failures.

This, of course, does not follow the pattern of the other test groups. If we omit this test from the final computation, the result becomes 26% for the 2000-volt groups.

Therefore, a group of 1 Mfd. capacitors constructed with two .0005" layers of Mylar A between foils can be expected to operate at 85° C. for a minimum of 72 hours, with a loss of not greater than 30% of the starting group.

B. Second, the 1 Mfd. unit constructed with two layers of .00025" Mylar A between foils.

The tests are not complete with this classification, but the chart (Part III, P. 28) shows some interesting trends. Tests NObsr #20 and #21 both yielded 50% Mylar failures at voltages of 1000 and 1200.. These two groups also were constructed with 1/8" margins. Yet, tests NObsr #49 and #51 run at 1400 and 1600 V.D.C. respectively show only 22% and 20% Mylar failures. These groups were constructed with 3/16" margin. Examination of the individual tests' data shows that very few in each group failed at the margins whether they be 1/8" or 3/16". The difference in this case seems to be caused

S-E-C-U-R-I-T-Y I-N-F-O-R-M-A-T-I-O-N

R-E-S-T-R-I-C-T-E-D

R-E-S-T-R-I-C-T-E-D

CONCLUSIONS (continued)

by differences in capacitance. The tests NObsr #20 and #21 average just under .9 Mfd. while that of test groups NObsr #49 and #51 about .75 Mfd.

To date, there has been only one group tested at each voltage. We will now repeat tests using units close to .9 Mfd. in value until we have sufficient data to make our conclusion.

C. Third, metallized Mylar Capacitors.

The test data with this material is by far too meagre to draw any conclusions. The indications are that it is superior to metallized paper both in electrical and temperature characteristics.

The last three tests we performed with this material, namely NObsr M#5, M#6, M#7 - were similar to the previous tests M#3, and M#4. However, with the last tests, we counted the actual number of temporary breakdowns, and were able to get an average expressed in terms of breakdowns per Microfarad. Here again, we have an indication of the pattern we expect to find. (Sec Part III, P. P. 29 - 41).

1. For 250 hrs. Life Test at 85° C. at 800 V. D. C.
4.2 temporary breakdowns per Microfarad.
2. For 250 hours Life Test at 85° C. at 1000 V. D. C.
23 temporary breakdowns per Microfarad.
3. For 250 hours Life Test at 85° C. at 1200 V. D. C.,
53 temporary breakdowns per Microfarad.

R-E-S-T-R-I-C-T-E-D

P A R T I I -- PROGRAM FOR NEXT INTERVAL

It is our plan to continue tests with the 1 Mfd. unit constructed with two layers of .00025" Mylar A. The results gathered thus far indicate that we should concentrate our tests on voltages between 1000 and 1500.

At any rate, we will repeat these tests until the data yields conclusive results.

The next type unit we will investigate will be 1 Mfd. constructed with two layers of .00025" and one of .0005" Mylar A. We will follow the same procedure with this type capacitor.

We have not received any .0001" Mylar, and unless we do, we probably will repeat these constructions with the .25 Mfd. capacitors before turning our attentions to the single film units.

We haven't received any Metallized Mylar this last quarter, so our plans with this material must wait. We have decided to have the material metallized to the following specifications.

.00025"	1" with 3/32" margins
.0005"	1" with 1/8" margins
.001"	2" with 3/16" margins

PLEASE SEE

PART III

WHICH FOLLOWS.

S-E-C-U-R-I-T-Y I-N-F-O-R-M-A-T-I-O-N

R-E-S-T-R-I-C-T-E-D

LIFE TEST RECORD

25 UNITS 1. MED. 2 X .5 Mm. V LOT NO. Nohsr 28
 SPECIFICATION FOR VERN CONTRACT NO. Nohsr 57200
 HOURS ON TEST 72 TEMPERATURE 85°C VOLTAGE 2100 DC
 Date started 26-Sept-52 Clock # 4 1115.5 Date finished 4 1230
 Tray # 6- Oct Qm Total Hours 114

ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Voltage - 2100 DC	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Short Pin After 72 Hrs																									
Cap. in Mfd. - 1000	5.8154	7.989																							
Power Factor in %	136	29																							
LIFE TEST FAILURES IN HRS.	.2			16	16	155	125	47		.2				57		Inad					185	1.5	51.5	22.5	

ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Short Pin After 72 Hrs																									
Cap. in Mfd. - 1000	5.8154	7.989																							
Power Factor in %	136	29																							

LIFE TEST RECORD

25 UNITS 1. Mid 2X.5 M.L.V. LOT NO. No. 29
 SPECIFICATION FOR WHOM CONTRACT NO. No. 57200

HOURS ON TEST 72 TEMPERATURE 85 °C VOLTAGE 2200 DC
 Date started Clock # 5 - 1013 Clock # 5 + c.c.h. = 3
 26. Sept. 52 6 - Oct. 52 Total Hours 101

ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Voltage - 22000 P	F	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Shunt R. in Mega-ohms	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K
Cap. in Mfd - 1000	940	915	957	926	880	812	824	842	830	862	918	811	890	812	934	851	866	924	911	915	896	896	896	896	896
Power Factor in %	34	37	38	43	39	37	37	37	39	38	38	36	36	36	35	42	37	39	38	37	41	39	37	37	37
LIFE TEST FAILURES IN HRS.					8	23549	45		305	14	9									3		1	99.5	29	

ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Shunt R. in Mega-ohms	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K
Cap. in Mfd - 1000	912	902	943	943	943	943	943	943	943	943	943	943	943	943	943	943	943	943	943	943	943	943	943	943	943
Power Factor in %	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39

Data collected by H.J. V. W. W.B

LIFE TEST RECORD

25 UNITS 1.0 MED. 2X.5 MIL - U LOT NO. Nabir - 30

FOR VERN

CONTRACT NO. Nabir 57200

HOURS ON TEST 72 +

TEMPERATURE 85 °C

VOLTAGE 2300 DC

Date started 26 Sept. 52

Clock # 6 - 7.17

Clock # 6 790

Total Hours 73

ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Voltage - 2300 DC	P	P	P	F	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Shunt R. in Mega-ohms	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K
Cap. in mfd - 1000	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918
Power Factor	0.37	0.44	0.43	0.43	0.39	0.46	0.42	0.43	0.41	0.42	0.39	0.4	0.53	0.43	0.43	0.36	0.37	0.4	0.46	0.45	0.46	0.42	0.48	0.48	0.48
LIFE TEST FAILURES IN HRS.	4/13	66			47	60			4		13.5				52			26		1		3/			

ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Shunt R. in Mega-ohms	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K	19K 60K
Cap. in mfd - 1000	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918	925.918
Power Factor	0.37	0.44	0.43	0.43	0.39	0.46	0.42	0.43	0.41	0.42	0.39	0.4	0.53	0.43	0.43	0.36	0.37	0.4	0.46	0.45	0.46	0.42	0.48	0.48	0.48

LIFE TEST RECORD

5 UNITS 1.4fd. - 2X.5.5U LOT NO. Nobsr # 31
SPECIFICATION FOR VEH V Winrath CONTRACT NO. Nobsr - 57200
HOURS ON TEST 72+ TEMPERATURE 85°C VOLTAGE 1900 0.0
Date started Clock # 10 590 Date finished Clock # 10 663
1/OCT/52 6 - OCT/52 - 52 Total Hours 73

ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Voltage-1900cc	P															→ P	→ P	F	P	→ P				→ P	
Went R in Mega-500/100K																→ 100K	→ 100K	→ 100K	→ 100K					→ 100K	
op. in Mfd. - 1000 Ys	.840	.890	.797	.843	.800	.932	.831	.899	.896	.845	.837	.928	.891	.781	.881	.889	.884	.935	.851	.850	.803	.898	.928	.933	
Power Factor in 2	.35	.37	.33	.36	.37	.48	.34	.43	.36	.4	.36	.38	.32	.37	.37	.37	.37	.39	.36	.36	.34	.35	.39	.37	
LIFE TEST FAILURES IN HRS.								43			23.5		71	40.5		.5			21						

ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Hunt R. in Mega-798		100K	100K	100K	100K	100K	100K			100K		100K			100K				100K	100K	100K	100K	100K	100K	100K
op. in Mfd. - 1000 Ys		.890	.812	.846	1.002	.921	.835			.840		.926			.892				.836	.599	.801	.914	.924	.933	
Power Factor in 2		.52	.55	.52	.87	.53	.52			.51		.53			.57				.53	.53	.47	.54	.51		
Unable to locate																									

LIFE TEST RECORD

15 UNITS 1.44d. - 2 X .5 U. wound with Mylar from 1st shipment LOT NO. Nobler 32
SPECIFICATION FOR VEH V. Winreth CONTRACT NO. Nobler - 57200

HOURS ON TEST 72+ TEMPERATURE 85°C VOLTAGE 2000 DC
Date started Clock # 11 289 Date finished Clock # 11 349 Total Hours 99
11 OCT 1952

ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Voltage - 2000 DC	P	F	P	P	P	P	P	P	P	P	P	P	P	P	F	P	P	P	P	P	P	P	P	P	P
Shunt R. in Mega. Ohms	1.011	1.004	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005
Cap. in Mfd. - 1000	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
Power Factor in %	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34

ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Shunt R. in Mega ohms	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
Cap. in mfd. - 1000 %	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
Power Factor in %	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	1.004/100K	
	1.004/100K	1.004/100K																							

LIFE TEST RECORD

15 UNITS 1.44d - 2 X .5 V - wound with Mylar from 1st shipment LOT NO. Nobsr # 33

SPECIFICATION

FOR WHOM V. Winroth CONTRACT NO. Nobsr - 57200

HOURS ON TEST 72 T

TEMPERATURE 85 °C

VOLTAGE 2000 DC

Date started

Clock # 12 174

Date finished

Clock # 12 373

Total Hours 101

1 Oct. 52

6 - Oct. 52

ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Voltage - 2000 DC	F	P	P	P	F	F	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	F	F
Shunt R in Mega-ohms	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K
Cap. in 44d - 1000 & 1000	1.008	1.037	1.044	1.044	1.044	1.044	1.01	1.029	981	1.026	1.04	1.052	1.05	1.004	1.034	989	993	1.031	1.033	965	1.052	1.051	1.051	1.051	1.051
Power Factor in %	42	44	44	44	44	44	44	45	41	45	45	43	44	43	44	41	42	43	42	4	43	44	44	44	44
LIFE TEST FAILURES IN HRS.	23									26			31												
Notes	Mylar failure, 1/4" from margin	Mylar failure, 1/4" from margin	Mylar failure, 1/4" from margin	Mylar failure, 1/4" from margin	Mylar failure, 1/4" from margin	Mylar failure, 1/4" from margin	Mylar failure, 1/4" from margin	Mylar failure, 1/4" from margin	Mylar failure, 1/4" from margin	Mylar failure, 1/4" from margin	Mylar failure, 1/4" from margin	Mylar failure, 1/4" from margin	Mylar failure, 1/4" from margin	Mylar failure, 1/4" from margin	Mylar failure, 1/4" from margin	Mylar failure, 1/4" from margin	Mylar failure, 1/4" from margin	Mylar failure, 1/4" from margin	Mylar failure, 1/4" from margin	Mylar failure, 1/4" from margin	Mylar failure, 1/4" from margin	Mylar failure, 1/4" from margin	Mylar failure, 1/4" from margin	Mylar failure, 1/4" from margin	

ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Shunt R in Mega-ohms	100K	100K	100K	100K				90K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K		100K	90K				
Cap. in pfd. - 1000's	1.016	1.016		1.067				1.034	1.991		1.038	1.048		1.009	1.034		1.003	1.029		.976	1.016				
Power Factor in %	35			38				39	39		37	36		35	37		36	38		37	37				
	Mylar Failure, 1/4" from margin	Mylar Failure, 1/4" from margin	Mylar Failure, 1/4" from margin				Mylar Failure. Outer film to bottom tab.			Mylar Failure, 1/4" from margin.			Mylar Failure. Outside film to the can at the margin.			Mylar Failure. Inner 1/4" of section. Middle of film.				Mylar Failure, inner 1/4" of section. 1/4" from margin.	Unable to locate failure				

LIFE TEST RECORD

25 UNITS 1. Mfd. 2X.5 U Mylar Capacitors
SPECIFICATION FOR WHOM

LOT NO. Nobsr 34

CONTRACT NO. Nobsr - 57200

HOURS ON TEST 72⁺

TEMPERATURE 85° C

VOLTAGE 1800 DC

Date started

Clock Tray 10-613

Clock Tray 909

Total Hours 146

9 Oct. 52

20.000-52

ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Voltage-1800dc	P	K																							P
Cap. in mfd. 1000	2.930	932	864	908	897	927	839	858	911	1014	923	948	850	939	864	907	960	891	933	919	909	810	915	937	85
Power Factor in	2.34	.33	.33	.33	.34	.33	.33	.33	.34	.33	.32	.39	.33	.33	.34	.34	.35	.33	.34	.35	.32	.31	.33	.36	.31
Shunt R. in Mega	100K	100K	100K	100K	90K	100K	100K	100K	100K	90K	90K	80K	100K	90K	100K	90K	90K	80K	90K	100K	90K	70K	90K	100K	100K
LIFE TEST FAILURES IN HRS.				6					48	17		7		17	2			5		23	14				6

ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Cap. in mfd. 1000	2.919	921	856	919	886	921	846	852																	
Power Factor in	2.45	.42	.39	.39	.35	.47	.5	.44																	
Shunt R. in Mega	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K
Notes																									

LIFE TEST RECORD

25 UNITS 1 add - 2X 5 V Mylar Capacitors 107 NO. Nobis 35

SPECIFICATION CONTRACT NO. Nobis - 57200

HOURS ON TEST 72 TEMPERATURE 25 ° C VOLTAGE 1900 DC

Date started Clock # 11 - 388 Date finished Clock # 11 655 Total Hours 200

9 Oct 52

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Shunt R. in Mylar 100K																									
Cap. in add - 1000 1/2 850 845 831 896 850 866 816 927 920 910 948 934 925 928 933 766 201 257 779 932 720 842 889 925 926																									
Varier Capacitor 10 34 34 24 35 34 24 32 35 35 35 36 95 37 34 35 34 33 35 35 32 32 36 35 35 37 36																									
Voltage - 1900 DC PK																									
LIFE TEST FAILURES IN HRS. 3					156	3					14														9

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Shunt R. in Mylar 100K																									
Cap. in add - 1000 1/2 838 892 895 896																									
Varier Capacitor 10 34 34 24 35 34 24 32 35 35 35 36 95 37 34 35 34 33 35 35 32 32 36 35 35 37 36																									
Voltage - 1900 DC PK																									
LIFE TEST FAILURES IN HRS. 3																									

LIFE TEST RECORD

25 UNITS 1.2Mfd - 2X.5V Mylar Capacitors LOT NO. N66SR 36

SPECIFICATION

CONTRACT NO. N66SR - 57200

HOURS ON TEST

TEMPERATURE 85°C VOLTAGE 2000 DC

Date started

Clock # 12 - 373 Date finished

Clock # 12 600

9 Oct. 52

20-0 QM-52 Tray #

Total Hours 227

ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Shunt R in Mega	100K	100K	80K	60K	90K	50K	100K	100K	100K	90K	50K	100K	100K	100K	100K	100K	70K	50K	60K	100K	100K	100K	100K	100K	100K
Cap in mfd	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Power Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Voltage - 2000 DC	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P

ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Shunt R. in Mega	100K	100K	100K		100K		100K		100K		100K					100K		100K		100K		100K		100K	
Cap. in mfd. - 1000 &	780	851	822	837	927		894		885		880					830		839		848		806		793	
Power Factor in %	.43	.37	.48	.42	.43		.44		.46		.38					.36		.39		.38		.38		.34	
																								</	

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ENGINEERING DEPT. C.L. 1002

TOBE DEUTSCHMANN CORPORATION

WORWOOD, MASS

F

UNITS	SPECIFICATION	FOR WHOM
25	1.44 - 2 x 5 v Mylar Capacitors	

LOT NO. N6b5r. 37

SPECIFICATION

FOR WHOM V. Winroth

CONTRACT NO. No 651 - 57200

HOURS ON TEST

72

Part 1 of 1

Clock **10**
Tray

508

Date finished

2.

Clock

940

1

Total Hours 131

Total Hours 151

ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Voltage - 1900V	P								X P		P													X P	
Sent R. 10 Mega-ohm K									X 100K		K 100K													X 100K	
Capacitor 1000 pF	826	936	918	943	904	933	792	888	936	874	866	908	904	1.12	885	856	856	870	870	918	822	810	848	848	883
Power Factor %	.34	.35	.36	.37	.32	.35	.36	.36	.37	.35	Winding at 100% 35°	35°	34	33	39	33	35	35	36	37	37	36	36	35	34
LIFE TEST FAILURES IN HRS.				8				52			Mechanical at 100% 35°	123						Immed	1.5	9	20.5				

ELECTRICAL TESTS AFTER LIFE TEST

[illegible]

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ENGINEERING DEPT. C.L. 1002

TOBE DEUTSCHMANN CORPORATION

H. J. V. W.

WOBURN, MASS.

LIFE TEST RECORD

UNITS 141d - 2X.5 U - Mylar Capacitors LOT NO. Nebser 99
 SPECIFICATION FOR WDM V. Winroth CONTRACT NO. Nebser - 57200

HOURS ON TEST 72+ TEMPERATURE 85°C VOLTAGE 2100 VDC
 Date started Clock # 12 600 Date finished Clock # 12 674
 20-08-52 24-08-62 Tray # x Total Hours 74

ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Voltage - 2100V	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Shunt R. in Mega 735/100K																									
Cap. in Mfd. 1000 2.915	946	933	1028	704																					
Power Factor in %	35	33	38	42	37																				
LIFE TEST FAILURES IN HRS.	52			20			2								1	5									

ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Shunt R. in Mega	190K	190K	190K	190K	190K	190K	190K	190K	190K	190K	190K	190K	190K	190K	190K	190K	190K	190K	190K	190K	190K	190K	190K	190K	190K
Cap. in Mfd. 1000 2.930																									
Power Factor in %	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	
Mechanical Failures	Mechanical Failure at winding	Mechanical Failure at winding	Mechanical Failure at winding	Mechanical Failure at winding	Mechanical Failure at winding	Mechanical Failure at winding	Mechanical Failure at winding	Mechanical Failure at winding	Mechanical Failure at winding	Mechanical Failure at winding	Mechanical Failure at winding	Mechanical Failure at winding	Mechanical Failure at winding	Mechanical Failure at winding	Mechanical Failure at winding	Mechanical Failure at winding	Mechanical Failure at winding	Mechanical Failure at winding	Mechanical Failure at winding	Mechanical Failure at winding	Mechanical Failure at winding	Mechanical Failure at winding	Mechanical Failure at winding	Mechanical Failure at winding	

LIFE TEST RECORD

15 UNITS 1. Utd. 2x.5 U Mylor Capacitors

107 NO. Nob5r 40

CONTRACT NO. Nob5r 57200

VOLTAGE 2000 VDC

TEMPERATURE 50°C

Clock # 10 - 941

Date finished 7 Nov 52

Clock # 10 - 10.13

Tray # 72

Total Hours 72

ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Voltage 2000 DC	P	K													P	P	P	P	P	P	P	P	P	P	P
Shunt R in Mega 100K																									
Cap. in Mfd. 10000																									
Power Factor in %																									

LIFE TEST FAILURES IN HRS.

ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Shunt R in Mega 100K																									
Cap. in Mfd. 10000																									
Power Factor in %																									

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Data collected by H.T. V.W.

ENGINEERING DEPT. C.L. 1002

TOBE DEUTSCHMANN CORPORATION

NORWOOD, MASS

LOT NO. No. 51

15UNITS 1.44d 2X.5V Mylar Capacitors
SPECIFICATION FOR VERN

FOR MEN

1ST NO SAVING HOURS ON TEST

794

TEMPERATURE

۱۰۰

VOLTAGE 2000 VOL

Date started	Clock #	17 - 173	Date finished
--------------	---------	----------	---------------

Clock

2-681

Total Hours 2

ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Voltage 200000 PK																									
Short P in Reg. 1000000																									
Cap. in 4000000																									
Power Factor in 2000000																									
LIFE TEST FAILURES IN HRS.	4	7	7	3	4	3	2.5	3	3.5	2	1.5	3.5	3.25	3.5	6	3.5	4			4	2.5	3	4	3.25	3

ELECTRICAL TESTS AFTER LIFT TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
	Mylar failure - outer 1/4 of section - 1/2" from margin	Mylar failure - outer 1/4 of section - at the margin	Mylar failure - outer 1/4 of section - 1/2" from margin	Mylar failure - outer 1/4 of section - at the margin	Mylar failure - outer 1/4 of section - at the margin	Mylar failure - outer 1/4 of section - 1/2" from margin	Mylar failure - inner 1/4 of winding - 1/2" from margin	Mylar failure - outer 1/4 of section - 1/2" from margin	Mylar failure - inner 1/4 of section - 1/2" from margin	Mylar failure - inner 1/4 of winding - middle of film	Mylar failure - outer 1/4 of section - at the margin	Mylar failure - outer 1/4 of section - 1/2" from margin	Mylar failure - outer 1/4 of section - at the margin	Mylar failure - outer 1/4 of section - at the margin	Mylar failure - outer 1/4 of section - 1/2" from margin	Mylar failure - inner 1/4 of section - middle of film	Mylar failure - outside turn, middle of film			Mylar failure - outer 1/4 of section - at margin	Mylar failure - outer 1/4 of section - 1/2" from margin	Nylon failure - middle of film	Section, middle of film	Mylar failure - outer 1/4 of section, at the margin	Mylar failure - outer 1/4 of section, at the margin	Mylar failure - outer 1/4 of section, at the margin

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Data collected by

www.

W.B.

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TOBI DEUTSCHMANN CORPORATION

KORWOOD, MASS

LIFE TEST RECORD

UNITS

44-25-11

Mylar Capenture

LOT NO.

303-12

SPECIFICATION

FOR WHOM V. H. H. H. H.

CONTRACT NO.

572-20

HOURS ON TEST

72

TEMPERATURE

25°C

VOLTAGE

100-0-100

Date started

Clock # 4

Tray # 4

Date finished

21-NOV-52

Clock # 4

Tray # 4

Total Hours

74

ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1																									
2																									
3																									
4																									
5																									
6																									
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21																									
22																									
23																									
24																									
25																									

LIFE TEST FAILURES IN HRS.

ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1																									
2																									
3																									
4																									
5																									
6																									
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ENGINEERING DEPT. C.L. 1002

TOBE DEUTSCHEMAN CORPORATION

Data collected by H.J. V. W.

BORWOOD, MASS

LIFE TEST RECORD

UNITS 100 25 U 1941 Capacitors LOT NO. 40051 73
 SPECIFICATION FOR WHOM V. Niccotti CONTRACT NO. 40051 73
 HOURS ON TEST TEMPERATURE 85° C VOLTAGE 200 VDC
 Date started Clock # 5-104 Date finished Clock # 5-113 Total Hours
17- Nov-52 Tray # 52

ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Voltage - 250 V	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Resistance - 10000	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Capacitance - 1000	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Leakage - 100	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Dielectric Strength - 1000	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Insulation Resistance - 1000	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Life Test - 1000	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Failure - 1000	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Life Test - 1000	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Failure - 1000	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK

LIFE TEST FAILURES IN HRS.

ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Voltage - 250 V	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Resistance - 10000	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Capacitance - 1000	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Leakage - 100	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Dielectric Strength - 1000	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Insulation Resistance - 1000	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Life Test - 1000	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Failure - 1000	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Life Test - 1000	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Failure - 1000	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK

Data collected by H.J. V.W.

LIFE TEST RECORD

25 UNITS 124d 2A.25 V Mylar Capacitors LOT NO. 45
 SPECIFICATION FOR WHOM V. W. H. CONTRACT NO. 57200
 HOURS ON TEST 72 TEMPERATURE 25 VOLTAGE 100
 Date started Clock finished Clock Tray Total Hours 74
 21 11/1/52 21 11/1/52

ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1																									
2																									
3																									
4																									
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23																									
24																									
25																									

LIFE TEST
 FAILURES IN HRS.

ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1																									
2																									
3																									
4																									
5																									
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Data collected by H. J. V. W.

LIFE TEST RECORD

UNITS

14-1 - 21-25 U

Mylar Capacitor

LOT NO.

11

SPECIFICATION

FOR WHOM

V.W.

CONTRACT NO.

11-11-52

HOURS ON TEST

72

TEMPERATURE

25°C

VOLTAGE

110-120

Date started

11-25

Date finished

24 Nov 52

Clock #

5-1211

Tray #

76

Total Hours

76

ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1																									
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LIFE TEST FAILURES IN HRS.

ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
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Page 19

Date collected by H.J. V.W.

ENGINEERING DEPT. C.L. 1002

TONE DEUTSCHMANN CORPORATION

BORWOOD, MASS

LIFE TEST RECORD

15 UNITS 1. 4ed. - 2X.25 U Mylar Capacitors LOT NO. Nobsr 47
 SPECIFICATION FOR WDM V. Winroth CONTRACT NO. Nobsr 57200

HOURS ON TEST 72 TEMPERATURE 85°C VOLTAGE 1200 VDC
 Date started Clock # 6 - 866 Date finished Clock # 6 - 943 Total Hours 77
 24 Nov. 52 24 - Nov. 52

ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Voltage 120000 PK																									
Shunt P. Mega. 90K																									
on 105V Meter																									
Cap. in used - 100000																									
Power Factor - 1/2																									

LIFE TEST FAILURES IN HRS. 2

ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Shunt P. Mega. 90K																									
on 105V. Meter																									
Cap. in used - 100000																									
Power Factor in 1/2																									

2.5 UNITS

25 UNITS / 45d.

2x.25 u

Mylar Capacitors

1

LOT NO. Nob5r " 49

SPECIFICATION

FOR FROM V. Winroth

CONTRACT NO.

Noobs 57200

TEST NO. 1000

72

TEMPERATURE: 85°C

VOLTAGE

2010

Declarado

POSTED BY

Clock 9 14 3

Date finished

Clock 8 - 749

ELECTRICAL TESTS BEFORE LIFE TEST

[illegible]

ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Shunt R. in Mega. 99%		100K	100K			100K	100K		100K	100K	100K		100K		100K		100K	100K	100K				100K	100K
at 105V																								
Cap. 12.45d - 1000 1/4		820	807			765	816		835	760			746		766		760	813	777				763	759
Power Factor in 70		.34	.37			.38	.34		.32	.33			.32		.35		.34	.34	.35				.35	.34

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Data collected by H.J. V.W.

ENGINEERING DEPT. C.L. 1002

TOBE DEUTSCHMANN CORPORATION

NORWOOD, MASS.

LIFE TEST RECORD

15 UNITS 1. Mtd. 2 X 25 M LOT NO. Nobsr 50
 SPECIFICATION Mylar Capacitors
 FOR FROM V W19074 CONTRACT NO. Nobsr 57200
 HOURS ON TEST 72 TEMPERATURE 85°C VOLTAGE 1500 VDC
 Date started Clock # 9-671 Date finished Clock # 9-750
 26 Nov 1952 Tray # 4 Dec. 1952 Total Hours 79

ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Voltage - 1500V	P																								P
Short Pin Mfg. Check																									100K
AT 70V																									
Cap. in Mtd. 1000	731	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	715
Power Factor 10%	37	35	37	37	35	35	37	37	35	36	34	34	34	35	35	35	36	4	32	34	35	35	35	34	35
LIFE TEST FAILURES IN HRS.				1		13	1	8							55	2				5	2	1			1

ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Short Pin Mfg. Check	100K/100K/100K			100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K	100K/100K
Cap. in Mtd. 1000	766	766	766	766	766	766	766	766	766	766	766	766	766	766	766	766	766	766	766	766	766	766	766	766	769
Power Factor 10%	34	33	43	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34

LIFE TEST RECORD

UNITS 1 vol 2 x 2-0

LOT NO. 115-1

SPECIFICATION

FOR WHOM 1941-2-10

CONTRACT NO. 115-1

HOURS ON TEST 2

TEMPERATURE 15

VOLTAGE 16

Date started

Date finished

Clock Tray

Total Hours

ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
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LIFE TEST FAILURES IN HRS.

ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
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ENGINEERING DEPT. C.L. 1002

TOBE DEUTSCHMAN CORPORATION

Data collected by H.T. V.W.

BORWOOD, MASS

LIFE TEST RECORD

10. 11. 2019.

CONTRACT NO. 11-1-72

VOLTAGE 17.1 mi.

Total Hours

ELECTRICAL TESTS BEFORE LIFE TEST

	Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	8												

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

[illegible]

LIFE TEST RECORD

LOT NO. N658 53

Mylar Capacitors

FOR WHOM V. Winroth

CONTRACT NO. N658 57220

VOLTAGE 1800 V.D.S.

TEMPERATURE 85° C

Total Hours 73

Clock #

Date finished

Tray #

11 Dec. 1952

ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Voltage																									
Sh. N. in Mfg. spec.																									
in 10 sec. METER																									
Cap. in MFD. 1000																									
Power Factor																									
LIFE TEST FAILURES IN HRS.																									

ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Sh. N. in Mfg. spec.																									
in 10 sec. METER																									
Cap. in MFD. 1000																									
Power Factor																									

1 Mfd. 2 x .5 Mil V

Bober #	Voltage	Temp.	Number of Units	Failed before Life	Started on Life	Mechanical Failures	Mylar Failures	Mylar Failures	Lot Material	Margin	Number Open after Life
7	600 D.C.	85° C.	25	—	25	—	—	4.	Lot #1	1/8"	0
8	800 D.C.	85° C.	25	—	25	—	—	8.	Lot #1	1/8"	0
9	1000 D.C.	85° C.	25	—	25	1	—	4.	Lot #1	1/8"	0
10	600 D.C.	100° C.	25	—	25	—	—	12.	Lot #1	1/8"	0
11	800 D.C.	100° C.	25	—	25	—	—	20.	Lot #1	1/8"	0
12	1000 D.C.	100° C.	25	—	25	—	—	24.	Lot #1	1/8"	0
13	600 D.C.	125° C.	6	2	4	—	—	0	Lot #2	1/8"	0
14	800 D.C.	125° C.	6	3	3	1	—	0	Lot #2	1/8"	0
15	1000 D.C.	125° C.	6	1	5	1	—	40	Lot #2	1/8"	0
16	600 D.C.	125° C.	25	1	24	—	—	4.16	Lot #2	1/4"	6
17	800 D.C.	125° C.	25	0	25	—	—	32.	Lot #2	1/4"	4
18	1000 D.C.	125° C.	25	0	25	—	—	80.	Lot #2	1/4"	4
22	1000 D.C.	85° C.	25	2	23	—	—	7.7	Lot #2	1/4"	1
23	1200 D.C.	85° C.	25	1	24	—	—	7.15	Lot #2	1/4"	1
24	1400 D.C.	85° C.	25	2	23	—	—	8.7	Lot #2	1/4"	0
25	1600 D.C.	85° C.	25	4	21	1	—	4.8	Lot #2	1/4"	4
26	1800 D.C.	85° C.	25	4	21	—	—	19.0	Lot #2	1/4"	2
27	2000 D.C.	85° C.	25	5	20	—	—	30.	Lot #2	1/4"	0
28	2100 D.C.	85° C.	25	2	23	2	—	43.5	Lot #2	1/4"	0
29	2200 D.C.	85° C.	25	4	21	1	—	62.0	Lot #2	1/4"	0
30	2300 D.C.	85° C.	25	4	21	3	—	52.5	Lot #2	1/4"	3
31	1900 D.C.	85° C.	25	1	24	2	—	29.2	Lot #2	1/4"	0
32	2000 D.C.	85° C.	25	4	21	3	—	19.	Lot #1	1/8"	1
33	2100 D.C.	85° C.	25	6	19	1	—	31.6	Lot #1	1/8"	0
34	1800 D.C.	85° C.	25	0	25	1	—	40.	Lot #2	1/4"	1
35	1900 D.C.	85° C.	25	0	25	1	—	24.	Lot #2	1/4"	1
36	2000 D.C.	85° C.	25	2	23	2	—	26.	Lot #2	1/4"	1
37	1900 D.C.	85° C.	25	1	24	4	—	20.85	Lot #2	1/4"	1
38	2000 D.C.	85° C.	25	1	24	3	—	29.	Lot #2	1/4"	0
39	2100 D.C.	85° C.	25	2	23	2	—	26.	Lot #2	1/4"	0
40	2000 D.C.	85° C.	23	3	20	1	—	0	Lot #2	1/4"	0
41	2000 D.C.	85° C.	25	2	23	0	—	100.	Lot #2	1/4"	0

1 Mfd. 2 x .25 Mil. V

Order #	Voltage	Temp.	Number of Units	Failed before Life	Started on Life	Mechanical Failures	Mylar Failures	% Mylar Failures	Lot Material	Margin	Number Open After Life
19	800 V.C.	85° C.	12	4	8	0	1	12.5%	Lot #2	1/8"	0
20	1000 V.C.	85° C.	12	4	8	1	4	50%	Lot #2	1/8"	0
21	1200 V.C.	85° C.	12	10	2	0	1	50%	Lot #2	1/8"	0
22	700 V.C.	85° C.	25	2	23	0	2	8.7%	Lot #2	3/16"	0
23	800 V.C.	85° C.	25	1	24	0	1	4.2%	Lot #2	3/16"	0
24	900 V.C.	85° C.	25	1	24	0	2	8.3%	Lot #2	3/16"	0
25	1000 V.C.	85° C.	25	2	23	0	1	4.3%	Lot #2	3/16"	0
26	1100 V.C.	85° C.	25	4	21	1	0	0%	Lot #2	3/16"	0
27	1200 V.C.	85° C.	25	3	22	1	1	4.5%	Lot #2	3/16"	1
28	1300 V.C.	85° C.	25	3	22	0	5	22.5%	Lot #2	3/16"	1
29	1400 V.C.	85° C.	25	7	18	1	4	22.3%	Lot #2	3/16"	0
30	1500 V.C.	85° C.	25	0	25	1	10	40%	Lot #2	3/16"	0
31	1600 V.C.	85° C.	25	5	20	0	4	20%	Lot #2	3/16"	1
32	1700 V.C.	85° C.	25	3	22	1	16	73%	Lot #2	3/16"	0
33	1800 V.C.	85° C.	25	5	20	2	14	70%	Lot #2	3/16"	0

LIFE TEST RECORD

UNITS 25 mfd - 2.5 mil capacitor 1" with 1/16" terminals LOT NO. NOBsr M-3
 SPECIFICATION FOR WHOM Eng Dept CONTRACT NO. NOBsr-55
 HOURS ON TEST 72 TEMPERATURE 85°C VOLTAGE 125V
 Date started 1156 Date finished 1156 Clock # 1 Tray # 1
 Total Hours 271

ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1st test																									
2nd test																									
3rd test																									
4th test																									
5th test																									
6th test																									
7th test																									
8th test																									
9th test																									
10th test																									
11th test																									
12th test																									
13th test																									
14th test																									
15th test																									
16th test																									
17th test																									
18th test																									
19th test																									
20th test																									
21st test																									
22nd test																									
23rd test																									
24th test																									
25th test																									

LIFE TEST FAILURES IN HRS.

ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
SWUNT R.M. N																									
10K 10K 1K 10K																									
CAPACITANCE																									
M.P. 12.102M																									
POWER FACTOR																									
N. 1/1																									



For _____ Spec. _____ Move Ticket _____ Date _____ 194_____

Assigned _____ JAN No. _____ Date Completed _____ 194 _____

SYMBOLS: T—TESTED P—PASSED F—FAILED S—SHORT t—TERMINAL c—CONTAINER R—RESISTANCE V—VOLTS

Notes:

This is not a count of the actual breakdowns but of the interruptions. At each interruption there are usually several breakdowns before the units heal themselves.

LIFE TEST RECORD

LOT NO. N0650M = 4

UNITS 25 units 0.5 units per 1" with 1/16" resolution

CONTRACT NO. N0650M

SPECIFICATION

HOURS ON TEST

Date started

FOR WHEN

TEMPERATURE

Date finished

7- Oct 52

Clock #

Tray #

Total Hours 205

VOLTAGE

1654

ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1																									
2																									
3																									
4																									
5																									
6																									
7																									
8																									
9																									
10																									
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22																									
23																									
24																									
25																									

LIFE TEST FAILURES IN HRS.

ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1																									
2																									
3																									
4																									
5																									
6																									
7																									
8																									
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23																									
24																									
25																									

Data collected by F. U. V. W. H. T.

BORWOOD, MASS

TOBE DEUTSCHMANN CORPORATION

108E

DATA SHEET

Type of Units • 25 4fd. - 0.5 mil nylon 1 1/16 755212

File No. Nobsr 4

For Spec. Page I

Move Ticket

Date

194

Assigned

JAN No.

Date Completed

194

SYMBOLS:

T-TESTED

P-PASSED

F-FAILED

S-SHORT

T-TERMINAL

C-CONTAINER

R-RESISTANCE

V-VOLTS

SAMPLE NO.

1

2

3

4

5

6

7

8

9

10

11

12

Breakdowns during life test strong enough to trip relay (Relay current 4-5 amp)
 Many breakdowns at start of test before all units were cured.

Breakdowns

Clock

Elapsed Time

14 01

1

14 01.25

.25

hrs. (unit removed to test)

1

14 03.5

2.5

"

2

14 04

3.0

"

1

14 05.5

4.5

"

2

14 06

5.0

"

1

14 06.5

5.5

"

1

14 07

6.0

"

1

14 12

11.0

"

1

14 20

14.0

"

1

14 23

22.0

"

1

14 24

23.0

"

1

14 40.5

34.5

"

1

14 49

42.0

"

1

14 46

45.0

"

1

14 55.5

44.5

"

1

15 31

130.0

"

1

15 32

131.0

"

1

15 38

137.0

"

TOBE

DATA SHEET

Type of Units - 25 ysd. - 0.5 mil nylon 1 1/4" margin Modified File No. N0651 "4

For Spec. Page 11 Move Ticket Date 194...

Assigned JAN No. Date Completed 194...

SYMBOLS: T-TESTED P-PASSED F-FAILED S-SHORT I-TERMINAL C-CONTAINER R-RESISTANCE V-VOLTS

SAMPLE NO. 1 2 3 4 5 6 7 8 9 10 11 12

continued

Breakdowns	Clock	Elapsed Time
1	15.40	139 hrs
1	15.63	159 "
1	15.45.5	194.5 "
1	15.47	196 "
1	16.33	232 "
1	16.52	251 "
0	Removed from Test	251 "

Note:

This is not a count of the actual breakdowns but of the interruptions. At each interruption there are usually several breakdowns before the units heal themselves.

N

UNITS	DESCRIPTION	FOR WHOM	CONTRACT NO.	LOT NO.
25	Pietrolized Nylon Capacitors - .25Wd. - 0.5 MIL Nylon - 1 inch diameter	V. M. Smith	96-570	175

SPECIFICATION

HOURS ON TEST		TEMPERATURE		VOLTAGE	
Date started	1-17-37	Date finished	1-17-37	Clock	1-17-37
				Tray	1-17-37
					Total Hours

ELECTRICAL TESTS BEFORE LIFE TEST

[illegible]

ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Shurtliff. 11/10/95. 11/1/100K	100K	150	100K	150	90K	100K	250	100K	100K	30K	100K	100K	100K	20K	100K	100K	100K	100K	100K	100K					
20 7.25 V 400K																									
Copied and - 1000K	100K	150	100K	150	90K	100K	250	100K	100K	30K	100K	100K	100K	20K	100K	100K	100K	100K	100K	100K					
Power factor - 1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2					

Number of Temporary Breakdowns vs. Time with 20 .25 Mfd. Metallized Mylar Units

Test No. 5 - Wbsr. 5/200	Clock Reading	Elapsed Time
	#1 1437	Start of Test
1	1509	72 Hours
1	1582	145 "
22	1585	148 "
1	1587	150 "
2	1690	253 "
1	1691	254 "
1	1712	275 "
1	1784	347 "
	1788	351 "

Test concluded

$$\frac{30}{5} \times \frac{250}{351} = 4.2 \text{ Temp. oven breakdowns/Mfd.}$$

for 250 hour life test
at 85° C. at 800 V.D.C.

Temporary Breakdowns during life Test strong enough to trip relays.

(Relay current = 4 - 5 milliamperes)

LIFE TEST RECORD

20 UNITS McTallised Mylar Capacitors - 2544d. - 0.5 MLC Mylar - 1" W. Th. Margin LOT NO. 140000 M⁶
 SPECIFICATION FOR WHOM V. W. WOODS Th CONTRACT NO. 57200

HOURS ON TEST 250 TEMPERATURE 85°C VOLTAGE 12.5 VDC
 Date started 2-16-54 Date finished 15 Dec 1959 Clock # 2 - 1972 Total Hours 212
 15 NOV 1952

ELECTRICAL TESTS BEFORE LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Voltage - 1000V PK																									
Short to ground																									
Cap in MFD - 2544d																									
Power Factor																									

LIFE TEST FAILURES IN HRS.

ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Short to ground - 1000V PK																									
Cap in MFD - 2544d																									
Power Factor - 90.52.7																									

Number of Temporary Breakdowns vs time with 20 .25 Mfd. Metallized Mylar Units

Test No. 6 - NObsr 57200

Temperature 85° C.

Voltage 1000 V.D.C.

<u>Number of Breakdowns</u>	<u>Clock Reading</u>	<u>Elapsed Time</u>
	#2 1654	Start of Test
20	1656	2 Hours
1	1657	3 "
1	1667	6 "
1	1664	10 "
8	1673	19 "
5	1677	23 "
6	1679	23 "
1	1680	28 "
16	1684	30 "
1	1685	31 "
1	1688	34 "
2	1688.5	34.5 "
1	1652	38 "
1	1700	46 "
1	1715	61 "
2	1720	66 "
9	1723	69 "
4	1724	70 "
1	1728	74 "
1	1780	76 "
1	1735	81 "
1	1744	90 "
4	1762	98 "
1	1793	139 "
1	1813	159 "
5	1816	162 "
4	1817	163 "
1	1820	166 "
2	1830	176 "
1	1834	180 "
1	1848	194 "
1	1853	199 "
1	1854	200 "
2	1858	204 "
3	1858.5	204.5 "

Test No. 6 - NUBer 57200 (Continued)

<u>Number of Breakdowns</u>	<u>Clock Reading</u>	<u>Elapsed Time</u>
2	1860.3	206.5 Hours
8	1861	207 "
1	1862	208 "
2	1862.3	208.5 "
6	1863	209 "
1	1863.5	209.5 "
4	1892	238 "
1	1897	243 "
—	1972	918 "

Test Concluded

$$\frac{147}{5} \times \frac{262}{318} = 23 \text{ temporary breakdowns/Mfd.}$$

for 250 hour Life Test at 85° C. and 1000 V.D.C.

Temporary breakdowns during Life Test strong enough to trip relays.

(Relay current 4 - 5 milliamperes)

SPECIFICATION

SPECIFICATION	FOR WHOM	CONTRACT NO.	LOT NO.
60 UNITS 100 Gallon Capacity - 25 Hpd - 05 Mils Mylar - 1" with 1/16 in. Mylar	V. Wright	57200	19 # 7

SPECIFICATION

IT'S NO SENIOR HOURS ON TEST

Page 018

Total Hours

ELECTRICAL TESTS BEFORE LIFE TEST

[illegible]

ELECTRICAL TESTS AFTER LIFE TEST

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Shot Hole No. 20434						100K 100K													> 100K 100K						
CN 475 V METER																									
Cop. In. 44-1 100K 100K		155	205	233	271	135	226	250	241	243	137	249	215	152	246	271	224	273	161	154					
Power Factor %		52	53	41	41	42	32	46	37	60	43	60	40	42	44	62	26	50	40	14					

Number of temporary breakdowns vs. Time 20 .25 Mfd. Metallized Mylar Units

Test No. 7 - N0bsr 57200

Temperature 85° C.

Voltage 1200 V.D.C.

Number of breakdowns

Clock reading

Elapsed Time

#3

625

Start of Test

53

627

2 Hours

21

627.5

2.5 "

4

628

3 "

3

628.5

3.5 "

2

629.5

4.5 "

7

630

5 "

1

630.5

5.5 "

6

632

7 "

2

639

8 "

6

635

10 "

2

636

11 "

1

639.5

14.5 "

3

642

17 "

11

642.5

17.5 "

1

643

18 "

2

644.5

19.5 "

1

646.5

21.5 "

44

648.5

23.5 "

7

653

28 "

3

655

30 "

1

659

34 "

3

660

35 "

1

663

36 "

5

668.5

36.5 "

22

671

46 "

1

671.5

46.5 "

3

673

48

Test No. 7 - NOber 57200

(Continued)

Number of Breakdowns	Clock Reading	Elapsed Time
1	677	52 Hours
1	678	53 "
1	679	54 "
4	707	82 "
22	717	92 "
3	717.5	92.5 "
1	718	93 "
3	719	94 "
1	727	102 "
1	730	105 "
1	734	109 "
1	737.5	112.5 "
1	740	115 "
1	746	121 "
1	758	133 "
1	761	136 "
1	787	162 "
1	810	185 "
3	844	219 "
--	875	250 "

Total 265

Test Concluded

$\frac{265}{5} = 53$ temporary breakdowns/mfd.

for 250 hour Life Test at 85° C. and 1200 v.D.C.

Temporary breakdowns during Life Test strong enough to trip relays.

(Relay current = 4 - 5 milliamperes)

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